Amendments to the Claims

This listing of claims will replace all prior versions and listings of claims in the application.

1. (previously presented) A method for scheduling multiple units of data requesting access to multiple ports in a network, the method comprising:

generating a request matrix that represents requests from particular units of data for particular ports;

generating a shuffle control that indicates a particular rearrangement of request matrix elements;

generating a shuffled request matrix, including;

rearranging, according to the shuffle control, a set request matrix elements selected from a group comprising request matrix rows and request matrix columns; and

rearranging, according to a reversed shuffle control, a set of matrix elements comprising a member of the group that was not selected to be rearranged according to the shuffle control;

performing arbitration on the shuffled request matrix to generate a shuffled grant matrix that represents shuffled granted requests; and

generating a grant matrix, including applying a de-shuffle control to shuffled grant matrix elements including rows and columns.

2. (original) The method of claim 1, wherein the multiple units of data are cells and the ports are egress ports of a packet switch, and wherein the method further comprises using the de-shuffled grant matrix to schedule a crossbar in the packet switch to perform cell transfers for one cell time.

3. (original) The method of claim 2, wherein the rearranging according to the reversed shuffle control occurs at alternate cell times.

4. (previously presented) The method of claim 3, wherein at cell times during which the rearrangement according to the reversed shuffle control does not occur, the request matrix rows and columns are each rearranged according to the shuffle control.

5. (previously presented) The method of claim 1, wherein the shuffle control comprises a reassignment of positions among respective matrix elements, wherein the matrix elements include rows and columns, and wherein the reversed shuffle control indicates a reassignment of positions among the respective matrix elements that is the reverse of the shuffle control reassignment.

6. (previously presented) The method of claim 5, further comprising generating the shuffle control using software, including:

performing a random_permute function to generate shuffle controls;

storing the shuffle controls in a random access memory ("RAM"); and

accessing the generated shuffle controls in sequence to generate shuffled request matrices.

7. (previously presented) The method of claim 5, further comprising generating the shuffle controls using at least one pseudo-random number generator.

8. (previously presented) The method of claim 5, further comprising deterministically generating the shuffle controls.

9. (previously presented) The method of claim 1, wherein the performing arbitration is performed by a wrapped wavefront arbiter ("WWFA").

10. (original) A switch fabric, comprising:

a plurality of ingress ports;

a plurality of egress ports;

a crossbar selectively configurable to couple ingress ports to egress ports;

a scheduler coupled to the ingress ports, the egress ports, and the crossbar, the scheduler comprising,

a shuffle component that receives a shuffle control value that indicates a particular rearrangement of request matrix elements, wherein a request matrix represents requests from particular ingress ports for particular egress ports, and wherein the shuffle control component generates a shuffled request matrix, including,

rearranging, according to the shuffle control value, a set of request matrix elements selected from a group comprising request matrix rows and request matrix columns; and

rearranging, according to a reversed shuffle control value, a set of matrix elements comprising a member of the group that was not selected to be rearranged according to the shuffle control value;

performing arbitration on the shuffled request matrix to generate a shuffled grant matrix that represents shuffled granted requests; and

a de-shuffle component that generates a grant matrix, including applying a de-shuffle control value to shuffled grant matrix elements including rows and columns; wherein the grant matrix is used to configure the crossbar.

11. (previously presented) The switch fabric of claim 10, further comprising a shuffle/de-shuffle control component coupled to the shuffle component and to the de-shuffle component, wherein the shuffle/de-shuffle control component generates control signals under software direction from a central processing unit interface to configure the crossbar to perform data cell transfers from the plurality of ingress ports to the plurality of egress ports once each cell time.

12. (original) The switch fabric of claim 11, wherein the rearranging according to the reversed shuffle control value occurs at alternate cell times.

13. (original) The switch fabric of claim 12, wherein at cell times during which the rearrangement according to the reversed shuffle control value does not occur, the request matrix rows and columns are each rearranged according to the shuffle control value.

14.-30 (cancelled)

31. (original) A method for scheduling data through a network component in a network that uses a strict priority scheme, the method comprising:

allocating egress port bandwidth for each of a plurality of component egress ports to various component ingress ports in a weighted round robin manner, wherein the allocation includes assigning

credits to each of the various ingress ports in proportion to a bandwidth allocation for an egress port;

determining which pending requests from ingress ports for egress ports will be passed to a crossbar scheduler, wherein the determination depends on a current number of credits assigned to an ingress port and a current strict priority assigned to the ingress port;

passing requests to the crossbar scheduler in the form of a request matrix;

operating on the request matrix, including,

generating a shuffled request matrix using the crossbar scheduler, including;

rearranging, according to a shuffle control value, a set of request matrix elements selected from a group comprising request matrix rows and request matrix columns; and

rearranging, according to a reversed shuffle control value, a set of matrix elements comprising a member of the group that was not selected to be rearranged according to the shuffle control value;

performing arbitration on the shuffled request matrix using to generate a shuffled grant matrix that represents shuffled granted requests;

generating a grant matrix, including applying a de-shuffle control value to shuffled grant matrix elements including rows and columns; and

using the grant matrix to configure the crossbar.

32. (previously presented) The method of claim 31, wherein allocation occurs at at least two levels, including:

a first level at which bandwidth is allocated among the ingress ports by a single egress port;

a second level at which bandwidth is allocated among multiple flows within each of the ingress ports, wherein a flow is characterized by an ingress port, an egress port, and a data class; and

a third level at which bandwidth is allocated among items selected from a group comprising at least one sub-port and at least one data sub-class.

33. (original) The method of claim 32, wherein multiple data classes are mapped to a single strict priority.

34. (previously presented) The method of claim 31, wherein:

all flows are initially assigned an initial number of credits in proportion to bandwidth allocated to the flow by an egress port, and all flows are initially assigned a same strict priority; and

a flow's request for an egress port is passed to the crossbar scheduler when the flow has a credit balance for the egress port that is greater than zero.

35. (original) The method of claim 34, wherein all flows are reassigned the initial number of credits for an egress port when all flows have credit balances of zero for the egress port.

36. (previously presented) The method of claim 31, wherein:

all flows are initially assigned an initial number of credits in proportion to bandwidth allocated to the flow by an egress port, and all flows are initially assigned a same strict priority; and

when a flow has zero credits for the egress port, the flow is assigned a different strict priority that is lower than the initially assigned strict priority such that requests from the flow for the egress port may be passed to the crossbar scheduler ~~if~~ when no flows with higher priority have pending requests for the egress port.

37. (previously presented) The method of claim 36, further comprising a saturation number of credits, which is a negative number such that when a flow has the saturation number of credits for an egress port, no requests from the flow for the egress port will be passed to the crossbar scheduler.

38. (original) The method of claim 37, wherein, when all flows have the saturation credit number for an egress port, all flows are reassigned the initial numbers of credits and the initial same strict priority.

39. (previously presented) The method of claim 31, wherein the rearranging according to the reversed shuffle control occurs every other time the crossbar scheduler is configured.

40. (original) The method of claim 39, wherein when the rearrangement according to the reversed shuffle control does not occur, the request matrix rows and columns are each rearranged

according to the shuffle control value.

41. (original) The method of claim 40, wherein when the shuffle control value indicates a reassignment of positions among respective matrix elements, wherein the matrix elements include rows and columns, and wherein the reversed shuffle control value indicates a reassignment of positions among the respective matrix elements that is the reverse of the reassignment indicated by the shuffle control value.

42. (previously presented) A method, comprising:

generating a plurality of values, in the form of a matrix, representing a plurality of requests to transfer a plurality of data between a plurality of ingress ports and a plurality of egress ports;

generating a random series of numbers representing matrix elements selected from a group comprising matrix rows and matrix columns;

rearranging, responsive to the random series of numbers, a set of matrix elements selected from the group; and

rearranging, responsive to a reverse random series of numbers, a set of matrix elements comprising a member of the group that was not selected to be rearranged responsive to the random series of numbers.

43. (original) The method of claim 42, wherein the plurality of data are cells and the plurality of egress ports are a plurality of egress ports of a packet switch.

44. (original) The method of claim 42, wherein the rearranging according to the reversed random series of numbers occurs at alternate cell times.

45.-47. (cancelled)